Dec. 21, 1965 E. P. FOSTER 3,224,067

FELTING NEEDLES

Filed Oct. 11, 1963

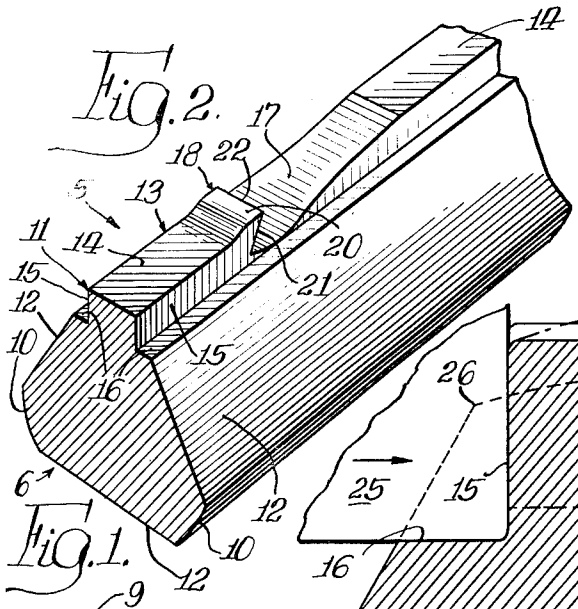

Fig. 2.

Fig. 1.

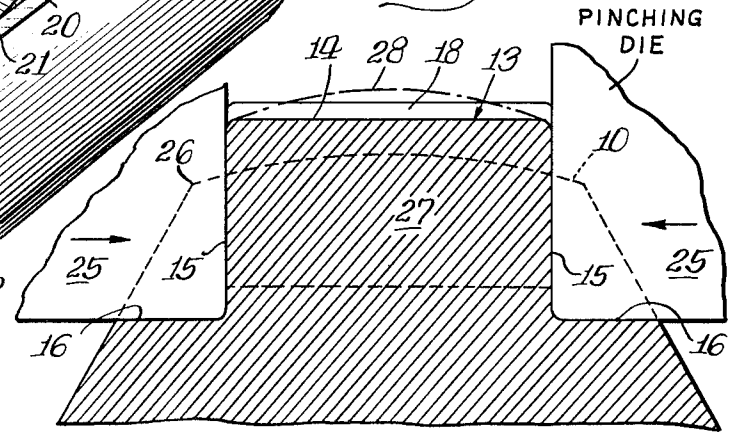

Fig. 3.

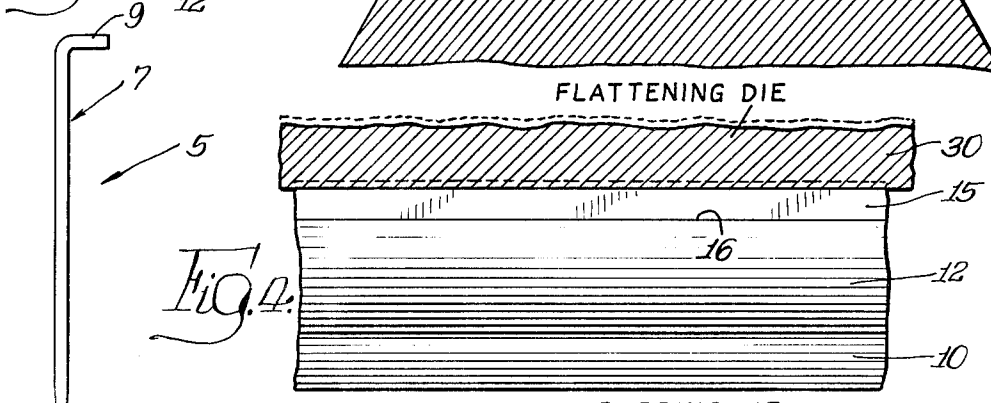

Fig. 4.

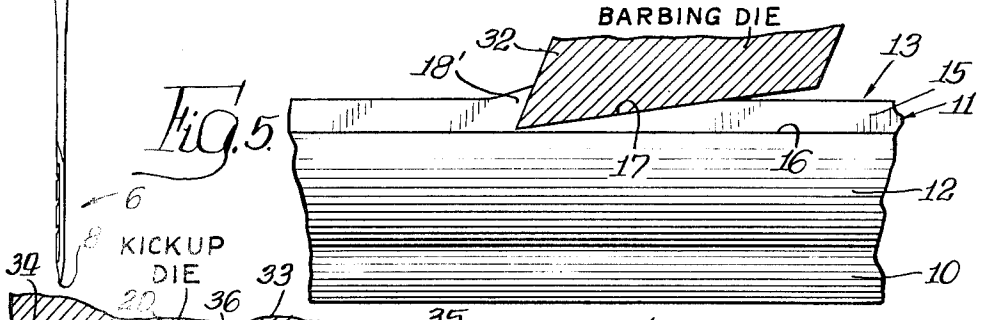

Fig. 5.

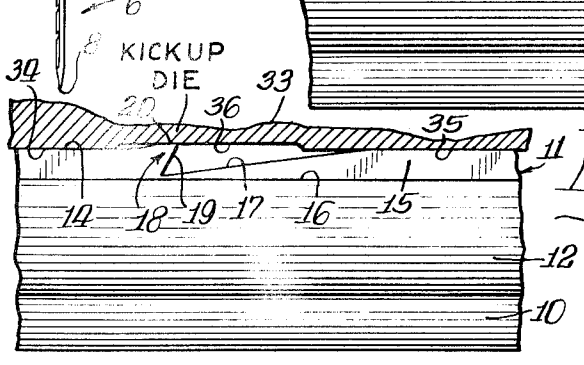

Fig. 6.

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FELTING NEEDLES

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My present invention relates to improvements in felting needles and more particularly to fine gauge felting needles having barbs of predetermined and exacting characteistics necessary for uniform interlacing work.

It is an object of the present invention to provide a felting needle in which the body is provided with a barb carrying ridge having a barb or barbs therein for effecting efficient interlacing of fibers and without damaging the fabric.

I propose to achieve the foregoing object by providing the body of a felting needle with a ridge having an outer wall and spaced apart side walls extending lengthwise of the body of the needle, in which the outer wall of the ridges lies outwardly of the original surface of the portion of the body at which the ridge is formed, and one or more barbs in the ridge. Preferably the side walls of the ridge at a barb constitutes the side walls of the barb so that the side and outer end edges of the barb are positioned relative to the body of the needle in positions at which they may readily engage and interlace fibers.

The barb carrying ridge of my present invention may be made of any desired width which, as noted, constitutes essentially the width of the barb. It is known that the width of a barb is an important factor in determining the degree of its effectiveness in interlacing fibers. Barbs of too narrow width are quite sharpe and usually are not desirable for fine felting in that they impart a raking action and damage the fabric. On the other hand, if the barbs are of excessive width they are less effective in engaging the fibers.

In my present invention desired ratios of barb width to barb depth may be readily achieved by forming the barb carrying ridge of a selected width and height and in preferred forms of needles of my present invention forming a barb in the ridge such that the foregoing ratio preferably is of the order of 2 to 1 or 3 to 1. At such ratios of barb width to depth raking is kept to a satisfactory minimum with satisfactory interlacing of fibers. As such ratio increases the raking action diminishes but as aforenoted, if the barb width is too great the barbs do not satisfactorily interlace fibers. However, it will be seen by reason of my present invention a wide range of ratios of barb width to depth may be readily achieved.

The felting needle of my present invention may be formed by swaging a portion of the needle body to provide a ridge of selected width and height having an outer wall and spaced apart side walls, which may be parallel or tend to converge inwardly, extending lengthwise to the extent desired of the needle body, and in which the outer wall of the ridge lies outwardly of the original surface of the body. A barbing die may then be applied to the ridge to swage a recess therein and form a barb above the recess of desired depth and in which the sides of the barb above the recess are defined by the side walls of the ridge. If desired the outer edge of the barb may project laterally outwardly of the outer wall of the ridge. By such method a barb is provided in which the side and outer edges may readily engage and interlace fibers.

In a preferred form of my invention the needle body is preferably of polygonal cross-section, such as the present common forms of needles having bodies of triangular cross-section, with the aforedescribed ridge and barb being formed at a corner edge of the needle body.

Now in order to acquaint those skilled in the art with the manner of fabricating felting needles in accordance with my invention, I shall describe in connection with the

accompanying drawing certain preferred embodiments of my invention.

In the drawing:

FIGURE 1 is an elevational view of a felting needle of my present invention fabricated in accordance with the methods of my invention hereinbelow described;

FIGURE 2 is a greatly enlarged perspective view of a body portion of the felting needle of FIGURE 1;

FIGURE 3 is a cross-sectional view illustrating the manner in which a ridge is formed by pinching dies in a corner edge of a triangulated body portion of a felting needle;

FIGURE 4 is a side elevational view of a portion of the body of a felting needle with a flattening die applied to the longitudinal outer edge of the ridge formed by the pinching dies of FIGURE 3;

FIGURE 5 is a side elevational view illustrating the manner in which a barb is struck in the flattened ridge at the corner edge of the body portion of a felting needle; and

FIGURE 6 is a side elevatioinal view illustrating the manner in which the barb of FIGURE 5 and adjacent body portion of the needle are swaged to provide a felting needle of my present invention.

Referring now to FIGURES 1 and 2 of the drawing, I have shown a felting needle **5** constructed in accordance with the principles of my present invention which comprises a body indicated generally at **6** and a shank indicated generally at **7**. The lower end of the body **6** is pointed as at **8** to facilitate penetration of fibrous material to be compacted in a conventional manner. The upper end of the needle may be bent substantially at right angles to the shank **7** to provide a securing element or ear **9** for clamping between a base member and a clamping member of a conventional needle plate. As is well known, such a needle plate is adapted to support a plurality of felting needles, such as shown in FIGURE 1, which in reciprocation of the plate in the felting machine effects the interlacing and compacting of loose fibrous materials.

The felting needles of my present invention may be made of any ordinary or conventional needle stock having the necessary mechanical strength as, for example, steel wire. In making up the needles of my present invention, preferably originally round steel wire stock is used from which a suitable length is cut to form a needle with a portion thereof, which is to become the body of the needle, preferably being swaged in accordance with conventional practice to form it of polygonal cross-section, such as of triangular cross-section, as shown, having rounded lengthwise edges **10** at the intersections of adjacent side surfaces of the body portion of the needle.

One or more of the rounded corner edges **10** or portions thereof of the original triangulated body **6** may be worked as by swaging in a manner to be described to provide a corner edge **11** extending lengthwise of the body **6** at the intersection of two adjacent side surfaces **12** of the body **6**. The corner edge **11** comprises a ridge **13** extending lengthwise of body **6** defined by an outer wall **14**, spaced apart side walls **15—15** and bottom walls **16—16** extending laterally from the bottom edges of the side walls **15—15** of the ridge to adjacent side surfaces **12—12** of the body of the needle. The outer wall **14** and spaced apart side walls **15—15** thus constitute a narrow outwardly projecting fin extending lengthwise of the body of the needle with the ridge being confined solely to the corner edge **11** of the body of the needle. The outer wall **14** of the ridge **13** thus formed, as will be clear from the below described method, lies laterally outwardly of the surface of the original rounded corner **10** of the needle body. A recess **17** and a barb **18** are formed in the ridge **13** as by a barbing die with the barb **18** having a quad-

rangular end wall 19 forming the working surface of the barb. The barb 18 in one form thereof has an outer lengthwise extending wall 20 terminating in an outer edge 22 defining the limit of the lateral projection of the barb beyond the outer wall 14 of the ridge 13. The side walls 21 of the working surface of the barb 18 lie in the side walls 15 of the ridge and it will thus be seen that side and outer end edges of the barb are in positions to engage freely and readily fibers to be compacted. One specific form of felting needle of my invention was formed from needle stock of 40 gauge material with a corner edge swaged to provide a ridge 13 of a height of .003 inch and having the surface of its outer wall 14 lying .0005 inch beyond the original rounded corner edge of the body portion, and being of a width of .005 inch, as compared to a width of .006 inch of the original rounded corner edge of the needle body. The ridge 13 thus, in effect, constitutes a narrow fin extending lengthwise of and confined solely to the corner edge of the body of the needle. The recess 17 measured .019 inch in length and terminated at its inner end approximately .0025 inch above the base of the ridge with the barb above the recess having its outer surface 18 projecting .0002 inch laterally beyond the surface of the outer wall of the ridge. The working surface of the barb 18 thus measured .0027 inch in depth and .005 inch in width thus providing a ratio of width of depth of approximately 2 to 1. It will be understood that the foregoing dimensions are of one form of needle of my invention and that other ratios of barb width to barb depth may be provided as desired.

In FIGURE 3 there is shown on a greatly enlarged scale one corner portion of a triangular needle body which has been swaged laterally inwardly by a pair of pinching dies 25—25 to displace material in forming the ridge 13 and its side walls 15—15. The side walls are for all practical purposes substantially in parallel relation with respect to each other although it will be understood that they may tend to slightly converge inwardly toward each other. The original rounded corner of the needle body is illustrated in dotted lines at 26, and the displaced material 27 assumes the form bounded by the end walls 15—15 and the curved upper dot-dash lines 28. It will be noted in this instance that the width of the displaced material 27 is less than the width of the original corner edge. Thereafter, a flattening die 30 as shown in FIGURE 4 is preferably applied to the curved upper edge 28 to provide the flattened outer surface 14 of the ridge 13. After flattening of the displaced material, a conventional barbing die 32 may be applied lengthwise to the ridge 13 to form the recess 17 and a barb 18'. The projection of the barb 18' may be controlled by application of barbing die 32 to complete one form of felting needle of my invention. However, thereafter, if desired, a kickup die 33 may be applied to the outer surface 14 of the ridge 13 above and below the recess to accurately form and locate the outer wall 20 of the barb 18 as illustrated in FIGURE 2 with respect to the outer surface of outer wall 14 of the ridge 13 adjacent the barb. The kickup die 33 is shown in profile and comprises a first edge surface 34 for engaging the outer surface 14 of ridge 13 above the barb 18 and a second edge surface 35 for engaging the outer surface 14 of ridge 13 below the recess 17. The surface of the edges 34 and 35 lie in a common plane. Between the edges 34 and 35 the die 33 is recessed with the plane of the end wall 36 of the recess lying in true planar spaced relation with respect to the plane of the edges 34 and 35 of the die. The depth of the recess of the die as determined by the position of end wall 36 is equal to the desired lateral projection of outer wall 22 of the barb beyond the plane of the surface of outer wall 14 of ridge 13. The material thus struck up by barbing die 32 is caused to be flattened by kickup die 33 to dispose the outer surface 20 defining the lateral projection of the barb 18 and the outer surface of outer wall 14 of the ridge 13 in predetermined spaced parallel planes with respect to each other and thereby provide an accurate kickup tolerance for the barb.

From the foregoing described embodiments of my invention it will be seen that felting needles may be provided in which the width to depth ratio of the working face of a barb may be accurately provided in a ridge extending lengthwise of the body of the needle. Further the outer edge of a barbing die may be disposed in desided relation to the plane of the outer wall of the ridge, and in addition, side edges of the barb are disposed in positions where they may freely engage fibers to be interlaced. Further, a barb depth may be provided that is not less than the height of the side walls of the ridge so that the side edges of a barb are in efficient fiber engaging positions.

It will be clear that in the methods of my invention that the pinching dies 25—25 may be utilized to swage material in the body of a felting needle to provide barb carrying ridges of desired widths and heights, that the outer surface of such a ridge may be flattened and then swaged by barbing and/or kickup die means to provide desired ratios of width to depth of a barb and projections of a barb with respect to the outer surface of the ridge.

While I have shown and described what I consider to be preferred embodiments of my invention, it will be understood that various modifications and rearrangements may be made therein without departing from the spirit and scope of my invention.

I claim:

1. A felting needle having a body of substantially triangular cross-section, a ridge on said body portion formed at a corner edge of two adjacent side surfaces of said body portion, said ridge having an outer wall and spaced apart side walls constituting a narrow projecting fin extending lengthwise of said body and confined solely to said corner edge, and a barb in said ridge.

2. A felting needle having a body of substantially triangular cross-section defined by flat outer side surfaces, a ridge on said body portion formed at a corner edge defined by the intersection of two of said side surfaces of said body portion, said ridge having an outer wall and spaced apart side walls constituting a narrow outwardly projecting fin extending lengthwise of said body and confined solely to said corner edge, and a barb in said ridge.

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